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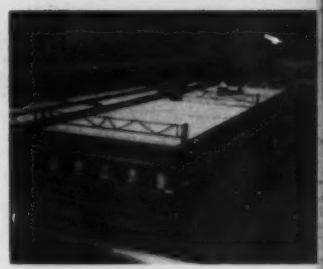
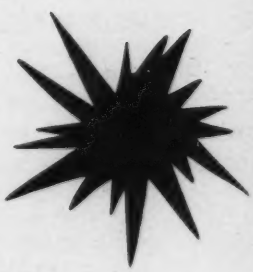
COMING NEXT MONTH

Revolution in Concrete. Just ten years ago (in June, 1950) the Skokie Laboratories of the Portland Cement Association were dedicated. This was a far more important and significant event than anyone could appreciate at the time. To learn why, we urge you to read Concrete Construction's searching examination of Skokie's far-reaching contributions to the cause of better and wider use of concrete in all types of construction.



Perlite Insulating Concrete. Offering weights in the very low range of 20 to 50 pounds per cubic foot, here's a material excellently adapted for floor fill, for light structural roof decks placed over formboards, and for insulation fill over metal decking and structural concrete.

Diagnosing Summer Concreting Ills. Hot weather brings some special problems for the concrete construction industry. Fortunately most of them can be solved at little cost by giving careful attention to a few basic principles.



Over 34,000 copies mailed. Edited for all who are concerned with quality, job placed concrete (including prestress, tilt-up, lift slab, and thin-shell)—its specification, production, handling, forming, reinforcing, placing, finishing, and curing: *Concrete Contractors, General Contractors, Engineers, Architects, Industrial Construction and Maintenance Men, Highway Engineers, Ready-Mixed and Prestressed Concrete Producers.*

About our page numbers: The pages of Concrete Construction Magazine are numbered continuously from January through December each year as a means of facilitating the use of bound volumes for reference purposes.

The concrete construction industry is well served by a number of excellent technical societies and trade associations. Here are some things you should know about the principal ones.

These Associations Can Help You

WHETHER YOU ARE A NEWCOMER to the field of concrete construction, or the oldest of old-timers, you may be surprised to know the extent to which you and your industry benefit from the services of a number of extremely active and highly effective organizations which have an interest for one reason or another in portland cement concrete. This article undertakes to tell you something about the programs of these organizations so that you will be more aware of their activities and better able to take advantage of their services, either as a member, where membership is open, or as a customer of the several supporting industries represented.

In selecting the associations and technical societies to be described here it seemed necessary to set some limits. For example, only those groups which are truly national in scope have been covered. It was also deemed necessary to use a somewhat arbitrary definition of which organizations had a primary interest in concrete construction, and which ones had only a secondary interest. For example, no coverage is given to the various national associations of aggregate producers, notwithstanding the fact that almost every organization in this field offers some form of technical assistance to users of concrete. This seems to us an entirely separate story project, and probably one well worth tackling on a major scale in the near future.

Of the nine organizations described here, only four (the AMERICAN CONCRETE INSTITUTE, the AMERICAN SOCIETY FOR TESTING MATERIALS, the NATIONAL CONCRETE CONTRACTORS ASSOCIATION and the PRESTRESSED CONCRETE INSTITUTE) offer participating paid memberships to contractors, engineers, architects and others involved in concrete construction work. The remaining five (the CALCIUM CHLORIDE INSTITUTE, the CONCRETE REINFORCING STEEL INSTITUTE, the NATIONAL READY MIXED CONCRETE ASSOCIATION, the PORTLAND CEMENT ASSOCIATION, and the WIRE REINFORCEMENT INSTITUTE) are supported by manufacturers in the various industries they represent, and to the extent that they provide information and technical assistance to users of concrete, these services are usually rendered without charge.

To help acquaint readers of Concrete Construction with the organizations referred to in this article, we have used the product columns beginning on page 140 of this issue to describe one or more free publications available from each of the several associations. Readers may obtain any of the listed publications by simply filling out one of the reply cards on page 136C and circling the numbers corresponding to the desired items.

FILE: Associations

American Concrete Institute

Founded in 1905, the American Concrete Institute is operated from headquarters located at 22400 West Seven Mile Road, Detroit 19, Michigan. There are currently three local chapters located in Los Angeles, San Francisco and the state of Oklahoma. This organization is dedicated exclusively to educational and scientific objectives unbiased by commercial interest. Its activities cover every conceivable phase of research, design, construction, and maintenance related to concrete. Several hundred of its members serve on more than 50 technical committees for the purpose of assembling and correlating technical information for the use of all members of the Institute as well as the general public. A staff of 20 people provides the editorial and administrative talents necessary to carry on the Institute's extensive publishing activities.

Ninety-five percent of the Institute's 10,000 members are individuals, while the remaining five percent consist of corporations and contributing members. Membership in the American Concrete Institute undoubtedly represents one of the finest bargains available to anyone in the concrete industry. The individual member, defined simply as a person associated in his technical interest with concrete, pays just $20 in annual dues anywhere in the United States, its possessions and North American countries. Individual members from other parts of the world pay $16 in annual dues.

A corporation member is a firm, corporation, society, public agency or other organization interested in the field of concrete. It pays $65 in annual dues and may name as its representative one individual who enjoys all membership privileges. A contributing member may be either an individual or corporation member who, because of some special interest in the work of the Institute, wishes to contribute to its support in larger dues. This type of member pays $135 in annual dues.

Junior memberships at $10 a year are available to individuals under 28 years of age, and student memberships at $5 per year are offered to students under 28 years of age who are in residence at a recognized technical engineering school. Junior and student members do not have voting privileges.

Membership in the American Concrete Institute forges an effective and creative working association between the individual and some 10,000 others with an important stake in the progress of concrete technology. The Institute draws together its membership of contractors, engineers, architects, educators and producers from 74 countries throughout the world in an annual meeting held somewhere in the United States. These are work sessions in the fullest sense, for a typical annual convention covers vast areas of experience, theory and practice as part of the Institute's continuing unbiased search for better concrete and better ways to use it. Area meetings give emphasis to local problems.

The Journal of the American Concrete Institute, published 12 times a year, is sent to all members. It provides the cornerstone of the Institute's publishing activities—reprinting convention papers, reporting on new developments, committee activities and research findings, and reviewing significant articles on concrete in other publications all over the world.

Special publications, including bound volumes of ACI standards, handbooks, manuals of design, inspection, and detailing, and special bibliographies, codes and studies are sold to members at approximately the cost of printing. Hundreds of separate prints and reprints of papers and reports are available at nominal prices. Members may also call upon the staff for assistance in developing answers to specific problems in concrete, and in finding sources of needed information, especially in ACI literature.

American Society for Testing Materials

This non-profit national technical society, the activities of which embrace research, and standardization of methods of testing and specifications for materials, is headquartered at 1916 Race Street, Philadelphia 3, Pennsylvania. Its work is accomplished largely through the activities of some 80 main technical committees which are responsible for the collection of data, the initiation and correlation of research, and the development of standard specifications and methods of test for materials. Although ASTM's activities cover materials of all types, much of the Society's work is concentrated on construction materials because of the special importance of standardization in this field. Concrete, cement, and aggregates are all dealt with by well qualified committees and subcommittees.

The six classifications of membership in ASTM are individual, company, sustaining, associate, student and honorary. An individual member is described simply as a person, technical or scientific

society, college or university or department thereof, library, government bureau or department, or such other organizations as the Society's board of directors may approve. In addition to an entrance fee of $10, individual members pay annual dues of $18. Currently ASTM has just over 10,000 members plus more than 5,000 committee members who are employed by member companies.

The Society regularly holds two national meetings a year—the annual meeting in June and the committee week meeting in February. Most of the technical committees and subcommittees meet two or three times a year.

Throughout its 60 years of service to industry and the nation, ASTM has followed a policy of rigorous examination, debate and ballot in all matters that come before it. Standards are adopted only after substantial agreement has been obtained from the principal interests concerned—consumers, producers and others. Painstaking efforts are put forth to insure that each standard adopted is practical, usable and satisfactory in all respects. As a result ASTM standards are known, respected and used throughout the entire world.

ASTM carries on an active publishing program covering an impressive list of standards, indexes, proceedings, symposiums and special publications. A printed list and description of all the publications will be sent free upon request to anyone. There are listed a number of titles of direct interest to concrete men. The series of Special Technical Publications has become one of the Society's major publishing activities. The STP's, as they are called, deal largely with research and engineering. More than 260 have been published on all materials subjects—30 in the last year. They are comprised of symposia or groups of related papers on a single subject. An example of interest to readers of Concrete Construction soon to be published is STP 266, Symposium on the Effect of Water-Reducing and Set-Retarding Admixtures on the Properties of Concrete. The STP's are for sale to members and non-members.

Other major publishing activities of the Society include ASTM Proceedings, the official record of yearly activities; ASTM Bulletin, a news medium published 8 times yearly; Index to ASTM Standards, issued annually; and the Year Book, containing a list of members, committee personnel and other information. Sent without charge to members, all of these publications except the yearbook may be purchased by non-members.

ASTM's monumental 1958 Book of Standards is published in 10 parts. Part 4, covering cement, concrete, mortars, road materials, waterproofing and soils, is perhaps of greatest interest to readers of Concrete Construction. This book may be obtained from ASTM headquarters for $12. The 1959 supplement is priced at $4.

Calcium Chloride Institute

Established originally in 1933 as the Calcium Chloride Association, the Calcium Chloride Institute has its main headquarters at 909 Ring Building, Washington 6, D. C. There are also field representatives located in the following cities: Racine, Wisconsin; Peoria, Illinois; Columbus, Ohio; and Williamsburg, Massachusetts.

This non-profit organization devotes its energies to engineering, research, and the distribution of information relative to all the uses of calcium chloride. A major portion of its program is necessarily concerned with concrete, which accounts for an important part of the total market for calcium chloride. Membership in the Institute is composed of manufacturers of calcium chloride.

A great number of the Institute's approximately 100 publications are devoted to the use of calcium chloride in concrete. Single copies of all publications are sent without charge to users of calcium chloride. The publication in greatest demand is Manual CM-1 entitled "Calcium Chloride in Concrete" which deals with the use of the product in all branches of the concrete industry.

The Institute's published literature on the use of calcium chloride in concrete contains the results of almost three decades of continuing engineering and research. This and other published material presents information based on investigations and research by such nationally recognized organizations as the American Concrete Institute, Bureau of Reclamation, the National Bureau of Standards and the Portland Cement Association.

Although concrete users cannot take part as members in the activities of the Calcium Chloride Institute, the organization is staffed to provide technical advice on any problem related to the use of calcium chloride. This, plus the policy of free distribution of published information, has made the Institute's program of great benefit to users of concrete.

Concrete Reinforcing Steel Institute

Founded in 1924 to carry on research work and to publish and disseminate information as to the safe and proper materials and methods to be used in reinforced concrete construction, the Concrete Reinforcing Steel Institute maintains offices at 38 South Dearborn Street, Chicago, Illinois. Its member companies operate some 400

plants engaged in manufacturing and/or fabricating steel reinforcement throughout the United States. Membership is limited to companies in these two categories.

The Institute is active in aiding and promoting the standardization of materials, nomenclature, specifications and building codes, and seeks constantly to dig out problems of every sort related to reinforcing steel in order to translate these promptly into research and field studies. Through the technical personnel of its member firms, as well as its own full-time staff of seven, the Institute participates constantly in programs and committee work of such organizations as the American Concrete Institute, the American Society for Testing Materials, and the Reinforced Concrete Research Council.

The Concrete Reinforcing Steel Institute maintains a vigorous program for publishing handbooks, manuals and booklets designed to assist and instruct the users of reinforcing steel. Some are sent without charge to those with a bona fide interest in the subject matter, while others (particularly two hard-cover volumes on design and practice) involve nominal charges. The "Recommended Practice for Placing Reinforcing Bars" was reviewed at some length in the March 1960 issue of Concrete Construction Magazine, page 63.

Perhaps one of the best known CRSI publications is "Reinforced Concrete Construction—A Manual of Standard Practice," single copies of which are mailed to the trade without charge. This 72-page book contains a wealth of very practical information on specifications, codes and design practices. Pocket sized and wall sized charts are also available showing the weights, old and new number designations, and nominal dimensions of standard A305 reinforcing bars and A408 special deformed round steel bars.

National Concrete Contractors Association

The National Concrete Contractors Association, with headquarters at 139 North Clark Street, Chicago, Illinois, was organized in 1957. Its purpose is "to foster improvements and extension in the use of concrete throughout the United States at a time when specialization is making greater management and technical demands on contractors everywhere."

The Association believes that if concrete is to hold its own among the other basic construction materials, it must be placed by experienced concrete contractors. NCCA provides its members with monthly newsletters, bulletins, and booklets covering complete information on new labor regulations, changes in tax laws, advanced methods in handling and placing concrete, and through its annual convention, presents an interesting and informative program to its members. The organization correlates information on job techniques and procedures and is equipped to assist in any labor-management problems. Reporting services in Washington and elsewhere keep NCCA informed of pertinent legislative developments.

Membership in the NCCA now totals nearly 360, consisting mainly of the members of local chapters in Chicago, Peoria, Akron, Atlanta, Dallas, Portland, and Milwaukee. Four other local chapters are being formed which will soon become a part of the Association. Any firm which does not come in as a member of a local chapter may join on payment of a fee of $50 per year.

A booklet is now available which defines the NCCA and explains what it can do for its members.

National Ready Mixed Concrete Association

Organized in 1930, the National Ready Mixed Concrete Association has its headquarters at 1411 K Street, N. W., Washington 5, D. C. Administered by a staff of 32 people, its broad program in behalf of the ready mixed concrete industry is conducted entirely from Washington.

Any person or firm engaged in the production or sale of ready mixed concrete is eligible for active membership, and associate memberships are open to companies or individuals furnishing materials, equipment or supplies to the ready mixed concrete industry. At present there are approximately 850 active members and 143 associate members.

This group holds an annual convention each year, usually in the month of February, and a biennial trade show in connection with conventions in even numbered years. Convention programs and exhibits usually offer a good deal of interest to users of ready mixed concrete.

NRMCA, in cooperation with the National Sand and Gravel Association, maintains a modern, well-equipped research laboratory at the University of Maryland, and much of the work undertaken relates to the end use of ready mixed concrete rather than just to its production. Published results of laboratory investigations are sent without charge to interested people. The Association represents and acts for its members before all divisions of government, and provides information to

members on all pertinent pending congressional bills. It is concerned with all phases of the ready mixed concrete industry—engineering and research, administration and business, taxes, labor relations, and public relations.

The National Ready Mixed Concrete Association is active in publishing papers prepared by its own staff and others in the industry. Single copies of approximately 35 titles are now available without cost to those requesting them. Also available at $8.00 per copy is a bound volume consisting of miscellaneous research reports and selected publications of reference value.

Although users of concrete are not eligible to membership in NRMCA, in one way or another they are the beneficiaries of most of the Association's activities. Members of the staff are active on the technical committees of such organizations as the American Concrete Institute and the American Society for Testing Materials. Through the Association's generous policy of publishing and distributing significant information without charge, the user of concrete has an easy means of keeping abreast of many of the important developments which concern him.

Prestressed Concrete Institute

PCI

Founded in 1954, this organization has its headquarters at 205 West Wacker Drive, Chicago 6, Illinois. It is a non-profit association of producers of precast and prestressed concrete products, but its membership embraces individuals and organizations in the engineering and architectural professions, teachers, and producers of materials and equipment allied to the prestressed concrete industry.

Dues for active members are based on the volume of their annual prestressed business, starting at $250 per year for sales of $100,000 or less, and increasing to $350 per year for sales from $100,001 to $500,000, with $100 a year additional dues for each additional $500,000 in sales thereafter. Associate members (suppliers to the industry) pay $250 annually, professional members (registered engineers and architects) pay $25 per year, affiliates (non-professional members) and juniors (architects and engineers in training) pay $15 annually. Students' dues are $10 per year ($12 in Canada).

PCI's charter calls for the establishment of industry-wide standards of production, quality control and uniformity, as well as the advancement of prestressed concrete acceptance through research grants to investigate new applications and engineering concepts. The Institute at present has approximately 700 members representing all sections of the country.

The headquarters in Chicago, where there is a full-time staff of 5 people, maintains an up-to-date library for the use of members, engineers, construction experts, architects, editors and students. Also now getting under way is an expanded public and industry information program designed to promote the economic, engineering and architectural advantages of using prestressed concrete for many types of construction.

PCI holds a convention once a year, and short courses are conducted several times each year. Publishing activities include a technical quarterly, the Jounal of the Prestressed Concrete Institute, and a monthly news publication called PCItems. The Institute also issues standards, specifications and reports relating to prestressed concrete construction. All publications are available for general distribution at cost.

Portland Cement Association

PCA

Known throughout the United States and Canada as a source of reliable information on every conceivable aspect of design and construction practice related to concrete, the Portland Cement Association is directed from main offices located at 33 West Grand Avenue, Chicago, Illinois. Approximately 400 research scientists, engineers, architects and writers make up the general headquarters staff, while the field organization consists of a network of 33 district offices staffed by more than 400 engineers, architects and specialists. This association describes itself as "a non-profit national organization to improve and extend the uses of portland cement and concrete through scientific research and engineering work." Its broad program of research, development, education, technical service and promotion is supported voluntarily by more than 70 member companies which produce a major proportion of the portland cement used in the United States and Canada.

While membership in PCA is open only to cement manufacturers, virtually all of its services and facilities are available to all users of cement and concrete. Its program of education and assistance has few parallels (if, indeed, any) in all industry, and this is backed and augmented by untiring research work carried on in a $10,000,000 laboratory located near Chicago. These are the largest and most completely equipped laboratories in the world devoted exclusively to research in cement and concrete, and they have made impressive contributions to the better knowledge of concrete which is largely responsible for the rapidly accelerating

use of this material in every type of construction.

Apart from its research activities (a story in itself which we hope to tell our readers something about in the near future), the aspects of PCA's program which most directly affect this publication's readers fall into three important categories: education, technical service and promotion. The educational program has as its primary aim the job of shortening the lag between the research laboratory and actual field application of improved techniques for using cement and concrete. Contractors, engineers, architects, students, construction agencies and others are assisted in obtaining better performance from concrete by means of thousands of lectures, short courses and demonstrations by staff members.

The Association also makes and widely distributes more than 75 motion pictures on the use of cement and concrete, and its publishing program, represented by some 400 pamphlets, brochures, handbooks and periodicals, undoubtedly far exceeds the amount of similar activity by many sizable organizations engaged exclusively in publishing.

Without in any way pre-empting the proper functions of engineers and architects, PCA provides technical service to the hundred of thousands of individuals and organizations who each year besiege its various field offices for some type of assistance. All requests receive prompt attention from competent staff engineers, and when necessary this service includes visits to job sites. The Association's field engineers themselves would be the first to proclaim that in this constant exposure to completely practical problems involving concrete, they learn as well as teach.

The Portland Cement Association is a vigorous promotional organization, and its staff and resources are constantly busy producing the various specific tools with which the many divisions of the concrete industries can develop broader markets for products and services. These endeavors include the fields of structures, paving, housing, conservation, water works, sewerage and sewage disposal, and railroad and farm uses. Among the techniques employed are national and local advertising, literature distribution, motion pictures, publicity and personal contacts.

It is difficult to think of an important aspect of concrete construction which has not been dealt with in one or more publications of the Portland Cement Association. A complete list of just those booklets, brochures and pamphlets currently in print would in itself be a formidable document. Single copies of all PCA publications are sent without charge to those who request them in the United States and Canada, and quantities for distribution purposes may usually be purchased at the cost of printing.

Wire Reinforcement Institute

WELDED WIRE FABRIC

This association of United States and Canadian manufacturers of welded wire fabric has its headquarters at 1049 National Press Building, Washington 4, D. C. Founded in 1930 to disseminate information about wire fabric and to extend its use through scientific and market research, the Institute maintains a staff of engineers to assist designers and builders on problems involving the use of fabric reinforcement.

A broad program of research into the properties of welded wire fabric and its characteristics and behavior in concrete is carried on, primarily through universities, engineering schools, and private laboratories. By a continuing public relations program, through press releases and photographs to trade publications, literature, motion picture films, slides and exhibits, the public is informed about welded wire fabric, its uses and advantages.

Membership in the Wire Reinforcement Institute is open only to actual producers of welded wire fabric in the United States and Canada. The 15 members which comprise the Institute at present are believed to account for over 95 percent of total United States and Canadian production of fabric.

The Institute is active in the publication of manuals, research papers and informative articles relating to welded wire fabric. Single copies of all publications are made available without charge to contractors, engineers, architects and others with an interest in the subject matter. Currently available are a general information booklet and separate manuals covering airport, farm and residential construction. A handbook on building design has just been published.

The Wire Reinforcement Institute is another example of an organization which renders valuable services to the user of concrete, even though its membership is not open to the trade. Experienced technical assistance can be obtained from the Washington headquarters on problems directly related to use of fabric in concrete, and copies of pertinent publications may be obtained simply by writing in on a company letterhead.

Readers who would like to have additional information from these associations may request it by circling the numbers on one of the reader service cards in this issue corresponding to the literature descriptions beginning on page 140.

Some practical and varied experience with these versatile materials for repair and maintenance on the New Jersey Turnpike

EXPERIENCE WITH EPOXY RESINS

BY HAROLD W. GOLDBERGER*

DURING THE PAST FEW YEARS many spalled areas have appeared in the reinforced concrete bridge decks and in the concrete slabs at interchange plazas and service areas on the New Jersey Turnpike. Investigation of the failures revealed that reinforcing steel was too close to the surface of the concrete. In some cases the steel was within ½ inch of the surface. Where that condition existed, hair line cracks appeared in the concrete deck surface. In time, these cracks became wider due to the use of rock salt for snow and ice control. Brine, formed by melting snow and the rock salt, found its way into the cracks and onto the reinforcing steel. The steel rusted under these conditions and finally spalled areas were formed. The size of the spalled areas varied from 2 by 2 inches to as much as 18 by 18 inches and from ½ to 1½ inches in depth.

In addition to the spalled portions, areas of concrete surface were found to contain polished aggregate. These areas were the result of a mechanical grinding treatment carried out in 1951 to correct irregularities measuring more than ⅛ inch vertically. This work was completed prior to the opening of the Turnpike to vehicular traffic. The grinding removed the top surface of cement mortar and perhaps some of the cementing action which holds the aggregate together to form a dense mass. Heavy traffic on the roadway surface plus the presence of brine from snow and ice control measures combined to remove more of the mortar from the surface and resulted in highly polished aggregate at each of the mechanically ground areas.

Hair line cracks were found in the surface of many reinforced concrete slabs. While these cracks did not seem to be dangerous, they were potential forerunners of spalled areas, particularly when located directly over reinforcing steel.

The spalled areas, polished aggregate areas and the hair line cracks were not solely confined to the larger bridges on the Turnpike, such as the Passaic and Hackensack River Bridges, but were found in many of the smaller bridges which carry the New Jersey Turnpike over streams, railroads and other roads.

Originally the Turnpike Maintenance Department filled the spalled areas with bituminous cold patch material which was purchased from local mixing plants. This material was installed rapidly and at very little cost; as might have been expected it lasted only a few days or a week at the most due to the heavy and fast moving traffic. While

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Typically disintegrated section of pavement. Note reinforcing close to surface. Note also how pavement spalls away from edges of existing patches.

the material costs were low, the traffic protection costs were high. The inconvenience to the traveling public had to be considered, as the closing of just one lane forced three lanes of traffic into two or even one lane. The average daily traffic for the year ending August 31, 1958, was 112,300 vehicles while the average daily traffic for the year ending August 31, 1959, was 125,000 vehicles. The daily average for the month of August 1959 was 146,000 vehicles.

A material had to be found which could be installed rapidly and which would last practically indefinitely. The Maintenance Department experimented with several products that the manufacturers claimed would meet these requirements. Finally two manufacturers provided satisfactory materials: an epoxy patching compound consisting of a two-component epoxy resin with the aggregate to be added by the user; and a two-component epoxy resin with aggregate and emery particles which provided a suitable dressing for anti-skid protection.

The first step in repairing spalled areas was to remove all loose particles of concrete by means of a small chipping hammer. The chipping hammer may be operated by either air or electricity. On the New Jersey Turnpike, the electrically operated hammer was used exclusively because each

Patching compound with sand or grit aggregrate added is poured into area to be patched and lightly troweled to a smooth finish.

While patching compound is still tacky, a coarse grit is sprinkled on surface for coarse texture. Completely cured patch blends in well with surrounding pavement.

Note that sound concrete on perimeter of patch has also been primed to prevent further spalling of pavement around patched area.

of the seven Maintenance Districts was equipped with a portable electric generator. After the surface of the spalled area was clean, sound and dry, the filling operation was started. The second step was to blend the two components of the epoxy resin by means of a small portable electric drill with wire paddles. It was essential that the entire contents of both containers be completely mixed until they were a uniform light gray color. The surface to be patched had to be primed with the mixture by means of a paint brush. To the balance of the mixture was added dry, manufactured sharp stone sand or silica sand. The electric drill was used again to blend the mixture and the sand aggregate. The mixing was continued until the drill and paddle were practically stalled by the mixture. The mixture was then placed in the spalled area and troweled to a smooth surface finish. While the mixture was still tacky, sharp sand or emery particles were spread lightly over the completed surface of the patch. The sand or emery was troweled into the epoxy resin while in the tacky condition to give the non-skid quality desired. The completed patches were a shade lighter than an average concrete slab; however, after a short time they could be distinguished only with the greatest difficulty.

It was found to be essential that the mixture be used immediately, particularly if the air temperature was above 70 degrees, and that the containers of the epoxy resin be kept in the shade or in cold water prior to their use in order to retard the action of the compounds. The epoxy patching compound, when thoroughly mixed, has a pot life of no more than thirty minutes at 70 degrees. For best results, traffic was kept off the patched areas for about four hours.

The second product was used in the same manner as the one described above, with the exception that the manufacturer had provided the aggregate in addition to the epoxy resin material. Preparation of spalled areas, mixing and placing were similar for both products. The first product provided about 2/3 of a cubic foot of mixture while the latter provided about ½ of a cubic foot of mixture. Both products are unharmed by freezing temperatures before or after use, are quick setting, waterproof, abrasion and chemical resistant. Both products may be "feather edged" and will bond to any reasonably clean and sound surface, free of oil or grease.

On the basis of successful experimentation with epoxy resins for patching spalled areas in concrete deck slabs in 1958, a contract was negotiated with a contractor by the New Jersey Turnpike Authority to patch the concrete deck of a viaduct on the Newark Bay-Hudson County Extension. The work was completed during the summer of 1959. Approximately 3,300 square feet of patching was installed at a total cost of $26,000 or about $8.00 per square foot. Because of the varied depths of the patched areas a cost per cubic foot cannot readily be computed. The cost of $8.00 per square foot includes labor, insurance, welfare and pension funds, materials, flagmen, tolls and performance bond costs.

A great many spalled areas approximately 1 to 6 inches wide, 12 to 60 inches long and as much as 4 inches deep were found at the ends of concrete slabs, i.e., at the expansion joints. In the past, it had been difficult to hold patches at these locations because of the action of traffic. On the Turnpike, these spalled areas were cleaned of loose particles, a small wooden form was set firmly against the edge of the expansion joint, and epoxy resin compound was installed. To date these repairs have been entirely successful.

The epoxy surface compounds have also been used to reinforce the existing polished surface of the concrete deck. The two compounds were mixed with the portable electric drill and then spread over the concrete without the addition of aggregate. In locations where the concrete surface was extremely rough, aggregate was mixed into the compounds as described above for spalled areas. As in the case of the spalled areas, the surface to receive this material must be clean and solid. The coating was spread with a trowel, brush or squeegee depending upon the thickness desired. Sharp sand or emery particles were spread lightly to provide a non-skid surface.

The epoxy crack sealer was used for sealing cracks in horizontal concrete surfaces. The two components of the epoxy resin were blended and then allowed to run slowly into the cracks which had been cleaned of dust, chipped particles or other foreign matter. Traffic was allowed on the completed work after four hours when the air temperature was 70 degrees or above.

In addition to the uses described above for spalled areas, polished areas and cracks, the Turnpike Maintenance Department has developed other uses for the epoxy resin and the sharp manufactured stone sand. These uses may or may not be confined to the New Jersey Turnpike. The first use was to eliminate slippery conditions on wide flange steel expansion joints, especially those installed on super elevated ramp pavements. The east bound ramp from the Bayonne Interchange, No. 14A, on the Newark Bay-Hudson County Extension, contains several skew expansion joints. Trucks with dual wheels traveling up the grade have experienced axle trouble because one set of dual wheels was on the concrete deck while the other set of dual wheels was on the slippery wide flange of the steel expansion joint. An attempt was made in 1958 to weld 45-degree angle beads on the flanges to improve traction, but this did not prove successful. During the summer of 1959 an epoxy resin mixture without aggregate was applied to the steel flanges of the expansion joints. While the

epoxy resin was still tacky, sharp stone sand was spread lightly on the mixture to provide a skid resistant surface. This type of surface treatment proved to be successful.

The second use was undertaken inside a second floor room of a New Jersey Turnpike Authority service area which houses air conditioning equipment. During hot humid weather parts of the equipment which could not be wrapped with insulation material to prevent warm air from coming into contact with cold piping or valves collected moisture which found its way to the equipment room floor. The moisture ran into cracks formed by the floor and walls of the room and eventually found its way onto the walls of a restaurant and gift shop located below. The paint on these walls was severely damaged.

To alleviate this condition, epoxy resin compound was first troweled onto the intersections of floor and walls to form a small triangle which prevented the moisture from seeping through. Then two walls one brick high were built inside the equipment room to form a trough for the moisture. Epoxy resin compound was troweled against the floor and brick as a waterproofing material. This waterproof trough led the moisture to a floor drain. The installation was completely successful in keeping moisture from the lower walls.

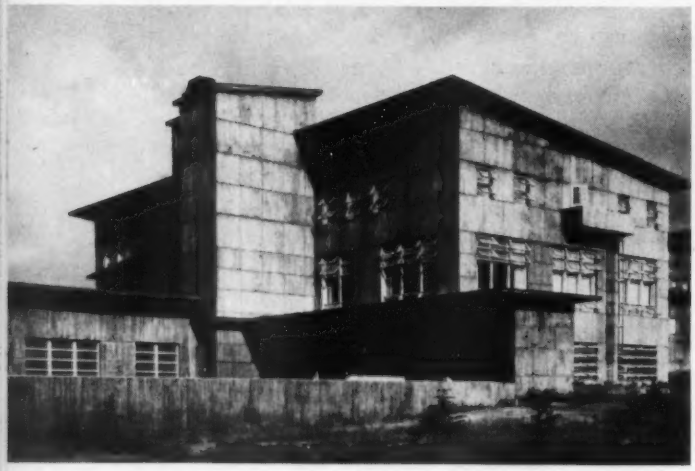
Epoxy resin will be used on the concrete steps from the platform level to the basement of the service area buildings in the immediate future. This use will be in conjunction with the installation of abrasive step nosings. The nosings when installed will be approximately ⅛ inch higher than the concrete tread. The epoxy resin compound will be placed in the space between the back of the nosing and the base of the concrete riser. Sharp stone sand or emery particles will be spread lightly on the still tacky epoxy resin compound to form a non-skid surface.

The use of epoxy resin compounds on the New Jersey Turnpike will result in longer life for the concrete bridge decks and other concrete areas and in lower maintenance costs for the overall bridge structures, service areas and interchanges. It is now possible to patch a spalled area and to expect the patch to last as long as the structure. It is also entirely practical to employ epoxy resins for the varied uses described above without resorting to expensive labor, equipment, tools and materials. END

Readers who would like to have additional information on the subject discussed in the foregoing article may request it by circling No. 547 on one of the reader service cards in this issue.

epoxy joint stronger than original concrete

The astonishing bonding powers of epoxy resins were dramatically demonstrated in a test conducted recently at the Bureau of Reclamation's Sixth Construction Engineers' Conference. In the photograph *L. P. Witte*, chief of the Bureau's Concrete Laboratory Branch at Denver, is pointing to an epoxy cemented joint which the test showed was stronger than the original concrete. Others in the picture are *H. T. Nelson*, Director of the Bureau of Reclamation's Region 1 Office at Boise, Idaho; *D. D. Johnson*, Engineer of the Columbia Basin Project; and *J. A. Callan*, Project Construction Engineer, Rogue River Basin Project at Camp White, Oregon.



Skillful application of stain gave the cast-in-place walls of this resort lodge a striking resemblance to natural wood. For a detailed description of this particular project, see Concrete Construction Magazine, October 1958, page 9.

Part 2—Applied Color

COLOR ON CONCRETE

This second portion of our two-part article on coloring of concrete, covers the methods for applying color to the hardened surface of concrete.

FILE: Color

PROBABLY THE MOST COMMONLY used ways of coloring concrete are those achieved after the concrete has completely hardened. These applied color techniques include paints, stains, plaster and stucco.

paints

Imposing volumes have been written on the subject of paints; here we can present only some general suggestions on how to achieve a long-lasting, striking job. Many types of paint, varying as to their base material, are on the market. The newest and perhaps most promising coatings are those using epoxy resins. They offer a durability which has surprised all who have used them. They offer high resistance to water infiltration and attack of acids and they also retard the growth of molds. At present the cost of epoxy paints is high, but refinements in production and increasing demand are expected to lower prices in the near future and make widespread use feasible.

Application practices dictate that a discussion of paints be split into two parts: (1) portland cement base paints; and (2) other types of paints.

Cement paints are noted for their durability in both exterior and interior applications (except on floors or other surfaces subject to abrasion). They even afford a certain degree of protection from water leakage and attack from some foreign agencies when several coatings are correctly applied. They should not be used when the atmosphere contains reactive fumes.

The concrete or stucco to be painted should be allowed to age at least three weeks before application. An even longer period should elapse when using colored paints to prevent efflorescence, allow weathering to lessen staining, make surface suction uniform and minimize crazing. The surface should be hosed clean or, if needed, thoroughly brushed. Remove any glazing and/or old coatings by acid etching or sand blasting. After wetting the surface, apply the mixed cement paint in a uniform layer (without doubling back) using an ordinary scrub brush. (Spraying of cement paints does not provide waterproofing properties as good as scrubbed-on coatings). With cement paints, proper curing is necessary to attain the hardness required for good performance. Therefore, the surface should be fog sprayed with water two or three times daily for at least two days after application of the final coat. This spraying should be started as soon as the surface is hard enough to withstand the force of the spray—usually about 12 hours after application of the final coat.

Other paints used on concrete include the following types: oil-base, varnish-base, lacquer-base, water-thinned, clear coatings and bituminous coatings. A look at the accompanying table, from the American Concrete Institute's "Guide for

COMMON USAGE OF PAINT ON CONCRETE

General type of paint	Outside walls				Inside walls (partitions)	Floors		Surfaces exposed to water
	Above grade		Below grade			On sub-grade	Not on sub-grade	
	Exterior surface	Interior surface	Interior surface	Buried surface				
Oil-base	x							
Varnish-base		x			x		x	
Lacquer-base	x					x		x
Water-thinned	x	x	x		x			
Clear coatings	x							
Bituminous coatings				x				x

Painting Concrete," will show the correct uses for these six types of paints.

The concrete to be painted should be seasoned and dry. Blistering and peeling of the paint is likely to result if the concrete is damp on the exterior or interior surface. This applies to all except the bituminous coatings and water-thinned paints. Since a clean surface is necessary for good results, the concrete should be hosed, brushed, air-blown or blast cleaned, depending upon the amount and kind of dirt or stain which must be removed. The paint should be carefully brushed, sprayed or rolled onto the clean, dry surface in air temperatures of at least 45 degrees F. Usually at least two coats are needed to achieve a durable film of paint in exterior work. This film should be at least 0.005 inches thick, which would require two coats of oil-base paint if it is applied at a rate of 500 square feet per gallon on a smooth surface. Interior surfaces do not require a coating this thick. Drying times range from 30 minutes for some lacquer-base and water-thinned paints up to 48 hours for some oil-base types.

stains

Decorative staining of concrete has become quite popular, especially when used in conjunction with surfaces cast against sand-blasted forms to simulate wood planks. In resort areas where fire resistance is often highly important, this makes possible a building which is both harmonious with its surroundings and safe.

Oil stains are commonly used for achieving wood-like coloring on concrete. For this purpose, a dilute solution of zinc sulfate (two pounds per gallon of water) is first applied to the surface to prevent saponification of the vehicle in the stain. Several metallic salt solutions (mild solutions of ferrous, ferric or cupric sulfates or chlorides) can be used to get brown, yellow, and green stains. It is possible to apply two separate solutions of different metallic salts to produce additional colors. For example, ferric chloride produces a brown stain. A surface so stained could then be given a coating of sodium ferro-cyanide to result in a dark blue color. Organic dyes offer a wide range of colors. These aniline dyes are used in wax solutions employing a solvent such as naphtha.

other means

Plaster and stucco offer additional means of producing color on concrete surfaces. In recent years the colors and textures in these media have been considerably augmented. Although stucco is not as popular in the North as it once was, it is still a favorite in the South and West where it is used with great imagination and versatility. Graffito is a variation on plastering in which several superimposed layers of variously colored plaster are applied to a wall. The surface is then scraped to various depths to produce a design. Although the technique called for is considerable, the finished surface has great beauty and depth. This is not a new method, having been used in Italy during the early Renaissance.

It is obvious that there are many ways in which color can be achieved on concrete surfaces. Undoubtedly more will be developed in the future. Work is now in progress to develop colored cements. With modern exact ready mixed concrete batching equipment, colored cement would make possible low-cost uniformly colored concrete. Its excellent adaptability to color is just another reason why concrete is fast becoming the preferred material throughout the American construction scene for buildings of all sizes and occupancies. END

Readers who would like to have additional information on the subject of applied color in concrete may request it by circling No. 548 on one of the reader service cards in this issue.

American Society of Civil Engineers Holds Convention in New York City

St. Lawrence project is judged engineering achievement of year

THE ST. LAWRENCE PROJECT, involving the power and seaway developments on the United States and Canadian sides of the St. Lawrence River, was named as the outstanding civil engineering achievement of the year at the 1960 national convention of the American Society of Civil Engineers. This is the first award made by the Society recognizing an achievement in civil engineering. Henceforth such an award will be made annually. The St. Lawrence project was one of 12 nominations made for the award from all parts of the country, involving all types of engineering developments. Judging was on the basis of (1) whether the project demonstrated skill in civil engineering, (2) whether the project contributed to engineering progress, and (3) the project's value to mankind.

Other nominations made in the competition for the 1960 award were as follows: Oak Street Connector, a highway and bridge development at New Haven, Connecticut; Torresdale Water Treatment Plant, Philadelphia, which serves 2,200,000 Philadelphians; Allegheny County Sewage System, which serves Pittsburgh and 69 other communities in the area; Oahe Dam, in South Dakota, an earth dam and control works; Executive House, an unusual apartment development in Chicago's loop district; Scioto Downs Grandstand, a modernistic stadium at a horse racing track near Columbus, Ohio; Wilson Lock, in Alabama, which serves navigation on the Tennessee River; Glen Canyon Bridge, on the Arizona-Utah border, which spans a 1,200-foot wide gorge of the Colorado River; Vandenburg Air Force Base, near Los Angeles, a missile operation; Priest Rapids Dam, on the Columbia River, in Washington; and Wichita Valley Flood Control Project, which has made Wichita, Kansas, flood-proof.

Several papers presented at the meeting dealt with prestressed concrete, emphasizing the growing importance of this material in construction. One paper was devoted to a discussion of admixtures to achieve the concrete properties demanded in modern construction.

Time to cure adequately and develop strength was given as the reason for the lasting qualities of the concrete produced by the Romans for their aqueducts in a paper by M. E. Prior of Dewey and Almy Chemical Division, W. R. Grace & Company. Today's concrete must be ready to take the full designed load almost as soon as it is placed, and new chemical admixtures are expected to make this attainable.

M. J. Gutzwiller of Purdue University and F. E. Musleh of Pierce, Gruber and Beam presented a paper on the results of a study of the effects of freezing and thawing on prestressed concrete. Post-tensioning was reported to improve durability. Absence of cracks as a permanent feature can be assured up to maximum design loading with the use of prestressed concrete.

Prestressed concrete in bridge construction in San Antonio, Texas, was reported as both practical and economical in a paper presented by Wayne Henneberger of the Texas Highway Department. The majority of spans on the structures are less than 68 feet, but experience on the project indicates the use of prestressed concrete in spans above 90 feet to be practical. Mr. Henneberger expressed the belief that prestressed lightweight concrete will gain importance, particularly in areas where hard rock aggregates are getting scarce.

The construction concept, design and economics of cast-in-place, post-tensioned concrete bridges of over 100-foot spans was the subject of a paper by Morris Schupack of Stamford, Connecticut. The use of prestressed concrete for long-span bridges is already well-known in Europe, but just beginning to be used in the United States. All such bridges now in use indicate good performance of the material.

Eric C. Molke of Albany, New York, reported on the construction of a prestressed concrete bridge with a span of 320 feet over Oneida Lake in New York. A ship channel which had to remain navigable during construction and the unusual span length presented challenging problems to engineers, who had very little data available on continuous precast bridges of such magnitude. END

Jet Age Concreting with Symons Steel-Ply Forms

Cuts Costs on Salt Lake Municipal Air Terminal

A combination of sound engineering, imaginative forming and efficient pouring methods have proved that even a jet age terminal building can be constructed rapidly and at moderate cost.

It was vitally important that costs be held to a minimum. Costs to the contractor on the basis of 150 re-uses of the forms amounted to about 1½c per square foot. After four months work, the cost of handling and stripping the forms had dropped about 25 percent, compared to previous methods of handling heavier job-made forms. Also, costs were progressively reduced with each use of Symons Steel-Ply Panels.

Designed for Salt Lake City Corporation by the architectural-engineering firm of Ashton, Evans and Brazier.

Christensen Bros., Salt Lake City, the builders, studied a number of forming systems. Symons Steel-Ply Forms were selected based on the recommendation of Earl Jensen, President of Contractors Equipment & Supply Company (Conesco), Salt Lake City.

To give itself every possible advantage, the company first ordered the Symons Forming System on a rental basis. It was complete with corners, adequate fillers for forming curved walls, ties, and all necessary parts of the hardware system. The selection proved so good that practically all of the forms were purchased before the option-to-buy period had expired.

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letters

Mr. Ross' letter published in the February issue of Concrete Construction and reprinted here has evoked two responses which we present. EDITOR

yield problem

Sir:

On a certain project we are getting 3.7 percent air in ready mix trucks using specification sand and gravel. On road slabs with 34 E pavers and essentially the same materials we are getting only 1.7 percent to 2 percent air, resulting in a yield loss of about 1 percent. Every conceivable test has been made and no one seems to be able to come up with any answer. Why?

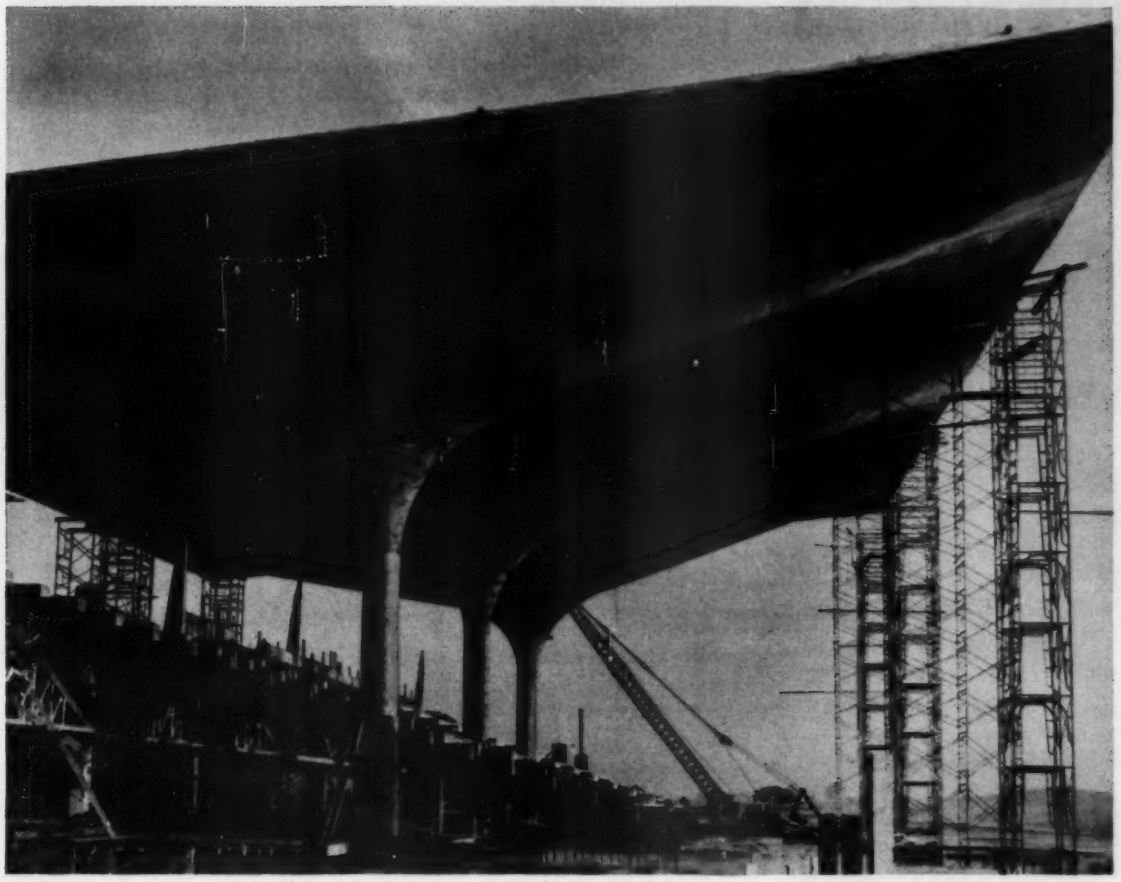
R. R. Ross
White Hall Cement Co.
Williamsport, Penna.

Sir:

We have observed with interest Mr. Ross' letter to the editor, page 42 of the February issue of Concrete Construction. This is a very interesting point and certainly one that not many people would care to crawl out on a limb concerning, but I will offer my two cents worth and take that risk.

I have been engaged in concrete construction and the concrete industry for approximately 34 years, starting as a kid in high school puddling concrete behind a 27 E paver. In all these years it has been my personal opinion, to which many will not agree, that concrete on paving jobs is very much under-mixed but with the minimum water content and the high cement content, it has

Owner: Scioto Downs, Inc., Columbus, Ohio; Architect: Kellam & Foley, Columbus, Ohio; Structural Engineer: Gensert & Williams, Cleveland, Ohio; General Contractor: Sheaf Construction Co., Columbus, Ohio; Concrete Supplier: Anderson Concrete Corp., Columbus, Ohio.



PLASTIMENT speeds placement of thin shell concrete

The nation's largest hyperbolic paraboloids roof the grandstand for new Scioto Downs Race Track in Columbus, Ohio. Each 400-ton shell is 60 x 116 feet and stands on a single column. 6½- and 7-bag mixes were used with slumps at 2" or less.

Plastiment provided low slump workability and stability during placement on the steeply sloping surfaces.

Early strength gains enabled the contractor to strip forms in 7 days. Strengths in 7 days averaged 3600 psi for the 6½-bag mix and 4700 psi for the 7-bag mix. Plastiment was used in proportions varying from 2 fluid ounces to 4 fluid ounces per sack of cement to provide uniformity with varying ambient temperatures.

Plastiment features are detailed in Bulletin PCD-59. Ask for your copy. District offices and dealers in principal cities; affiliate manufacturing companies around the world. In Canada, Sika Chemical of Canada, Ltd.; in Latin America, Sika Panama, S. A.

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been possible to obtain desired strength. I have also felt that with additional mixing, better cement dispersion would be obtained and we would obtain more efficiency from our cement with greater strengths on a lesser cement factor.

I believe that what Mr. Ross has to say concerning getting 3.7 percent air out of ready mix trucks as compared to 1.7 percent air on a 34 E paver with the same concrete design, might bear up to the same reasoning as the above in that cement dispersion and air dispersion probably go hand in hand. National specifications on a truck mixer today utilizing approximately 62½ percent of the total drum volume require a minimum of 70 revolutions at a mixing speed minimum of 4 rpm and a maximum of 225 peripheral feet per minute, and agitating beyond that at 2 to 6 rpm, whereas I believe that the speed of a road paver is somewhere around 15 to 20 rpm and the normal mixing time usually does not exceed 1½ minutes per batch.

I wonder if a test has been made by Mr. Ross to provide 2, 3, or 4 or maybe 5 minutes mixing time in the 34 E, and, if so, what the air content was.

OTIS MANCHESTER, JR.
Concrete Transport Co.
St. Louis, Missouri

The problem which Mr. Ross of the Whitehall Cement Company has encountered with 34 E pavers is not uncommon. The reasons for the lower air content with these mixers than with ready mix trucks are many and varied.

Usually a paving mix is lower in sand content than the comparable one put out in a truck. This fact alone will lower the air content in the paver concrete. This would be one of the first places to look for trouble.

Other points that should be checked are the condition of the mixing drums for cleanliness, and the condition of the blades. The latter have been found to be worn to such an extent that they are non-existent. Both of these conditions make for inefficient mixing and resultant low air contents.

Time of mixing is another factor that will affect the entrainment of air in concrete. The paper "Effect of Mixing Time and Overload on Strength of Concrete" recently presented at the Highway Research Board meeting in Washington by D. O. Woolf of the Bureau of Public Roads points up this fact. The data presented indicate that the highest strength concrete is produced by a 60-second mixing cycle, but the air entrainment is generally lowest at this point. Maximum air contents are developed in shorter mixing cycles probably because the mixing action typical of a paver in good condition tends to drive out some of the entrained air.

The only practical way to overcome this deficiency in air in paver mixers, when using air entraining cement, is to add an air entraining agent at the mixer to supplement the material in the cement. When using non-air entraining cement the addition rate of the admixture may be as much as 50 percent greater in a paver mixer for the same air content produced in a central mix plant.

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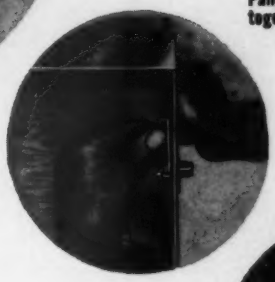
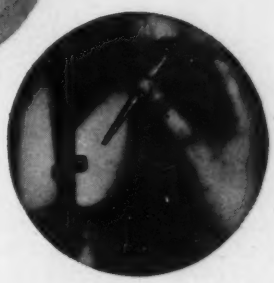


2. Tie Key set into the Tie Loop. Panel and Tie are now locked together into integral unit.



3. Next UNI-FORM Panel is placed in position. Tie Loop automatically enters square tie hole. Key is dropped in—assembly is complete. NO COMING BACK TO "FISH" TIES.

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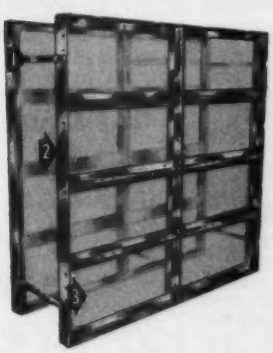

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Typical **WELD-CRETE** Applications

GRANVILLE ST. BRIDGE, VANCOUVER, BRITISH COLUMBIA—One of the largest 8 lane bridges in North America. Here Weld-Crete was applied to bridge surface to bond cement dividing strips. Now, over 4 years later, bonds are as good as new. *General Contractor:* Dominion Bridge Company.

SEVEN CORNERS SHOPPING CENTER, FALLS CHURCH, VIRGINIA—During construction of this 600,000 sq. ft. structure, initially only part of floor was poured and floated to a smooth finish. Areas in which show windows would be added were poured as base slab only. Slab was coated with Weld-Crete. After store fronts were custom-built, delayed toppings of 1" to 1½" thick were poured with assurance of permanent bond to base slab. These toppings were then finished with asphalt tile, wood, or finish flooring of lessee's choice. Designed and constructed by The Kass Realty Co. of the Kass-Berger Organization under direction of J. Franklin Groff. *Concrete Contractor:* Moses-Ekco.

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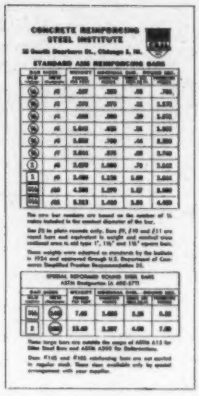
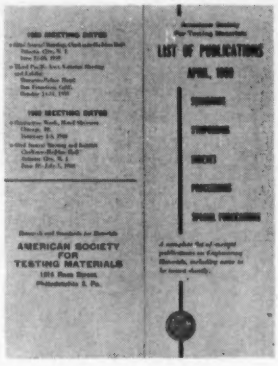
products

For additional information circle matching key number on reader service card on page 136C.



reinforcing bars 523

Technical data is readily available from a celluloid pocket sized chart of standard A305 reinforcing bars, special deformed round steel bars, standard hooks, slants and bar laps. Concrete Reinforcing Steel Institute, 38 S. Dearborn St., Chicago, Ill.



catalog of publications 524

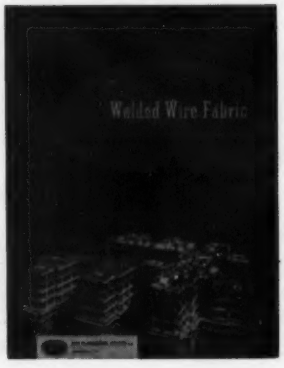
Current publications available from ASTM are listed in a catalogue. Standards, symposiums, indexes, proceedings and special publications are included. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

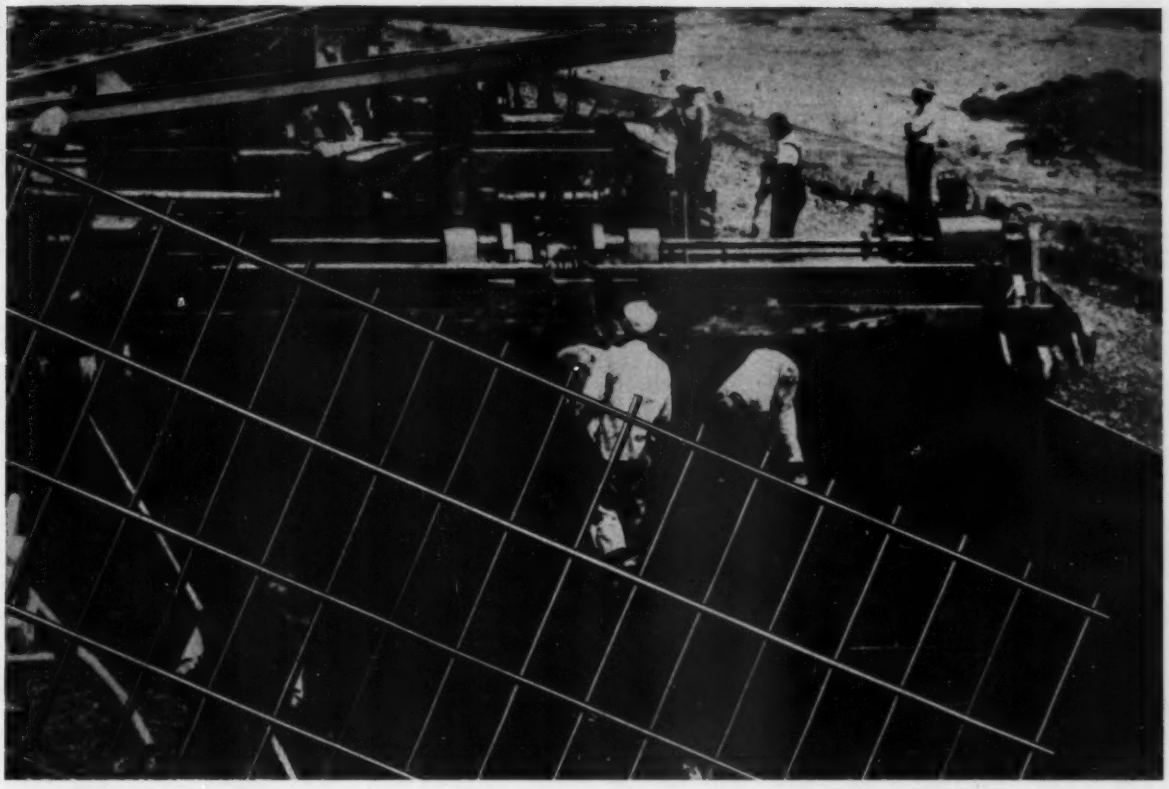
technical committees 525

A booklet is written in the form of a conversation between an old technical committee member and a new comer to explain the operation of the American Society for Testing Materials and the function of its committees. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

design manual 526

Welded wire fabric in reinforced concrete building construction is the subject of this manual. Comprehensive design and construction data on many phases of building construction are included. Wire Reinforcement Institute, National Press Building, Washington, D. C.





Sinews of steel
to strengthen concrete construction

Clinton Welded Wire Fabric

For years, CF&I has worked closely with the construction industry, developing strong welded steel mesh for reinforcing purposes. The result: CF&I-Clinton Welded Wire Fabric.

This rugged mesh gives concrete structures—from bridges and roads to culverts and skyscrapers—maximum strength and durability. Its dependability stems from the high quality of the steel wire used.

CF&I-Clinton Welded Wire Fabric is manufactured to all ASTM specifications and is furnished in either rolls or mats. It is supplied in a wide range of gages and spacings. For complete information, call our nearest sales office.

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THE COLORADO FUEL AND IRON CORPORATION

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Pretensioning

Richmond
Strand
Deflection
Inserts for
prestressed
concrete
beams and
girders

Included in Richmond's complete line of inserts and accessories for prestressed concrete are a variety of strand deflecting devices, designed to accommodate ¾", 1" and 1¼" bolts or eye bolts to suit your project and match your pretensioning bench.

Richmond Strand Deflectors are manufactured for single, double and triple lines of strands and are available with or without keepers or rollers.

There is a standard line of Richmond Strand Deflection Inserts but, since requirements for deflecting devices vary widely, special units can be manufactured on request to suit individual needs.

For information about Richmond-engineered Strand Deflection Inserts for prestressed beams and girders contact us or our distributors: Intercontinental Equipment Co., Inc., 120 Broadway, New York 5, N. Y....and if you have a specific concreting problem, ask our Technical Department about it—they can help you. Write to:—

Richmond
SCREW ANCHOR CO. INC.
INSIST ON RICHMOND
AND BE SURE IT'S RICHMOND

Main Office: 816-838 LIBERTY AVE., BROOKLYN 8, N. Y. Plants & Sales Offices: Atlanta, Georgia • Ft. Worth, Texas • St. Joseph, Missouri • **In Canada:** ACROW-RICHMOND LTD., Orangeville, Ontario.

Circle 515 on reader service card

products

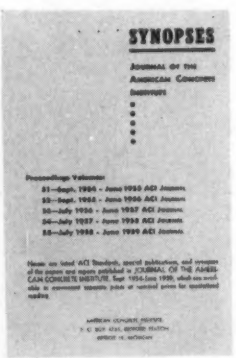
For additional information circle matching key number on reader service card on page 136C.

calcium chloride 527

A manual is offered to concrete users to provide a ready reference on the effects of calcium chloride in concrete. Calcium Chloride Institute, 909 Ring Building, Washington 6, D. C.

street paving 528

A pocket guide for the paving inspector and superintendent on concrete city street projects discusses all phases of the subject and provides valuable information for the paving contractor. Portland Cement Association, 33 W. Grand Ave., Chicago, Ill.



catalog of publications 529

Included in this catalogue are listings of ACI standards, special publications and synopses of papers and reports published in the Journal of the American Concrete Institute from September 1954 to June 1959. American Concrete Institute, P. O. Box 4754, Redford Station, Detroit, Mich.

prestressed products 530

Diagrams in this book illustrate individual products sold by individual producers in greatest quantity. This book of prestressed products representative of today is a prelude to standardization in a manual of tomorrow. Prestressed Concrete Institute, 205 W. Wacker Drive, Chicago, Ill.

STOW CONCRETE NEWS LETTER

Nashville Contractor Picks G-46B Roto-Trowel for the Big Jobs

Clarence Schaub Construction Co., Nashville, Tennessee needed a giant-size troweling machine to finish the concrete floor of a new big-volume warehouse.

On the recommendation of local distributor Wilson, Weesner & Wilkinson, Inc., Schaub Construction chose the Stow G-46B Roto-Trowel. On-the-job performance of this trowel quickly proved its superiority in speed and handling ease. Schaub's Job Superintendent and Trowel Operator both said of the G-46B . . . "Easiest handling trowel we've ever used and we get the best finish possible!"

With four trowel blades, and that big 46" diameter, the G-46B powered by 6.8 HP engine cuts finishing time way down, finishes faster by far!

Put a G-46B to work on your large-area concrete finishing jobs. Your men will do better, faster finishing jobs with Stow Trowels. They like Stow's top-quality features: Safety Guard Ring, New Sheave-Type Manual Clutch Control, Convenient Pitch and Throttle Regulators.

Choose the Roto-Trowel you need from Stow's complete line of Trowels, Screeds, Concrete Grinders, Tampers and Vibrators.

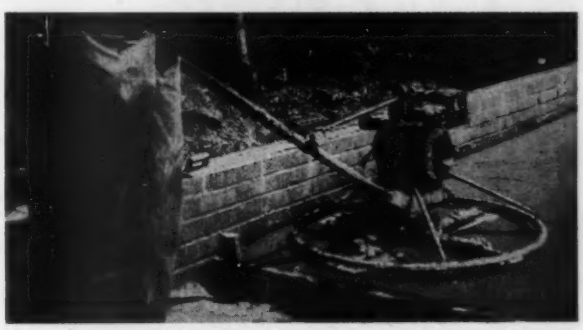
Stow G-46B Roto-Trowel in operation on warehouse floor finishing job, Nashville, Tenn. Control ease is demonstrated as operator varies blade pitch with right hand while guiding Roto-Trowel with left hand.

Fuller Construction Standardizes on Stow Roto-Trowels for Concrete Finishing

In a recent interview, Mr. W. V. Fuller, President of the Fuller Construction Co., Greensboro, North Carolina, reported, "Our Stow Roto-Trowels are easier to operate, less costly to maintain and produce better finishes than any of our other troweling machines!"

Mr. Fuller's comments are typical of Stow Roto-Trowel users—and with good reason. Stow's complete line of Roto-Trowels offers a range of sizes to fit every troweling need. Seven models are available in diameters ranging from 29" (G-29), to 46" (G-46B), with appropriate HP ratings of 2.2 HP to 6.8 HP.

Small diameter models are equipped with 3 blades, the large diameter models with 4. Some models possess interchangeability features so that grinding blocks may be used. Stow's heavy-duty, sheave-type clutch is also an optional feature which many contractors find desirable.



G 34-4C Roto-Trowel finishing garage floor. Handling ease enables operator to trowel up to wall base.

All the more reason to specify Stow for your own individual requirements. For the full story on Stow's complete line of job-tested Roto-Trowels, Vibrators, Grinders and Screeds, clip the coupon. Stow will send you the facts by return mail.

STOW MANUFACTURING CO. **Dept. E-6**
354 Shear St., Binghamton, N. Y.

Send me Cat. 580 *today!*

Name..... Title.....

Company.....

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City..... State.....

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Seven Ways To
Better, Faster
Concrete Finishing
28" Tri-blade
Combination
Floating and
Finishing machine
NOW
7 Different
CHALLENGE
Instant Trowels
A model and size for every finishing requirement. Each is a fast operating unit, with up to 145 r.p.m. trowel speed, that gives you smoother, more durable surfaces in less working time. See them all . . . try them out . . . then pick the machine best for you.
36"
Tri-blade
and
Four blade
models
48" Tri-blade
and Four blade
models
18" Grinding disc
24" Floating disc
Adaptable to
48" machine
Write or phone for literature or to arrange a job demonstration.
CHALLENGE-COOK BROS.
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3334 SAN FERNANDO ROAD, LOS ANGELES 65, CALIFORNIA, CLINTON 6-3151
SUCCESSOR TO: CHALLENGE MANUFACTURING CO., AND COOK BROS. EQUIPMENT CO.

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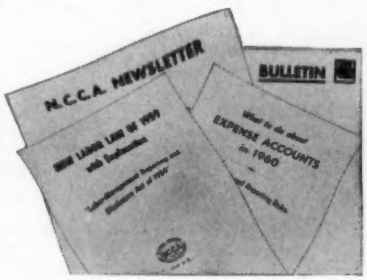
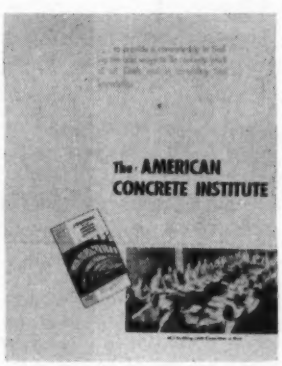
products

For additional information circle matching key number on reader service card on page 136C.



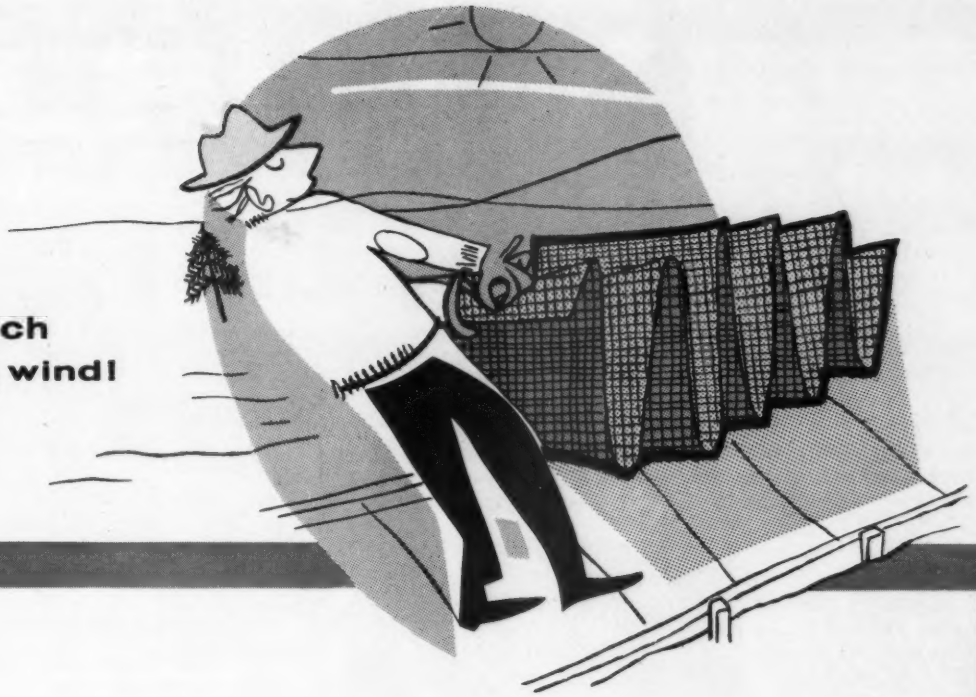
NCCA publications 531

Pictured here are covers of some of the many helpful publications available from NCCA. Technical problems with concrete, as well as legal and business problems, are covered in the bulletins and newsletters from this group. National Concrete Contractors Association, 139 N. Clark St., Chicago, Ill.



ACI membership 532

Individuals and firms with a stake in the technical development of concrete will find in this folder an explanation of the function of American Concrete Institute, the services available to members, and a table of membership fees. American Concrete Institute, P. O. Box 4754, Redford Station, Detroit, Mich.



For quality concrete...

make sure it's protected from drying winds!

Hot weather or cold, even a light wind can increase evaporation rates to critical levels. Curing of concrete stops—quality suffers.

In windy weather, protect concrete *during* placing with windbreaks—even well before you are ready to begin curing. And *start* curing as soon as possible.

For quality concrete every time, keep crews informed of facts like these. You can do it conveniently and dramatically with this set of 4 posters. They cover heat, freezing, wind and excess water. Fill in the coupon below for your set.

Quality Reminder posters, 22" x 17", 3 colors. Sets of 4 are free.

FREE: SEND FOR YOUR POSTERS TODAY!

PORTLAND CEMENT ASSOCIATION

Dept. 5-98, 33 West Grand Avenue, Chicago 10, Illinois

A national organization to improve and extend the uses of concrete

Please send a free set of Quality Reminder posters. I could also make use of ( ) additional sets.

Company name_____

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Thor

Everything you want in Power Trowels... *and more!*

This is the easy handling Thor power trowel with a 39" blade sweep, available in three or four blade design. Delivers more output per operator. Light and portable. Automatic blade tilt with finger-tip control. Rugged tubular construction. All working parts encased for extra long service. 29" model available. Check your Thor construction equipment distributor. Thor Power Tool Co., Aurora, Ill. Branches in all principal cities.

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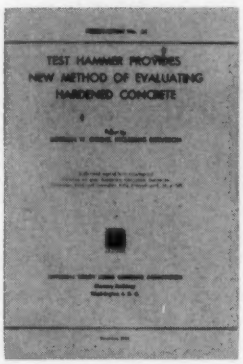
products

For additional information circle matching key number on reader service card on page 136C.



test hammer 533

A booklet explains the use of the Schmidt concrete test hammer to determine the strength of nearly any concrete mass that has a smooth, flat surface. Results of tests made with the instrument are compared with results of compression and flexure tests. Factors causing variation in results with each test method are discussed briefly, and the accuracy of the test hammer is compared with that of the testing machine. National Ready Mixed Concrete Association, 1411 K St., N. W., Washington, D. C.

reinforcing in houses 534

Prepared in cooperation with Wire Reinforcement Institute, a report from the National Association of Home Builders Research Institute provides basic technical data showing how to produce high quality reinforced concrete, speed up job operations, and secure maximum economy through the use of the best practicable methods, materials, and job practices on house construction projects. Wire Reinforcement Institute, National Press Building, Washington, D. C.

ALPHA

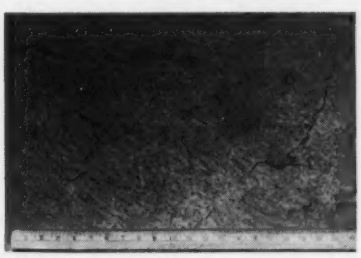
BETTER CONSTRUCTION THROUGH BETTER USE OF CEMENTS

news and notes from the field

How to Avoid Crazing in Concrete Surfaces

CRAZING or map-cracking of a concrete surface. Excessive shrinking occurred before sufficient strength had developed to resist the shrinkage forces.

Crazing cracks which appear on the wearing course of concrete are superficial cracks that rarely penetrate deeply. They are caused by surface shrinkage resulting from improper finishing practices and/or inadequate curing.

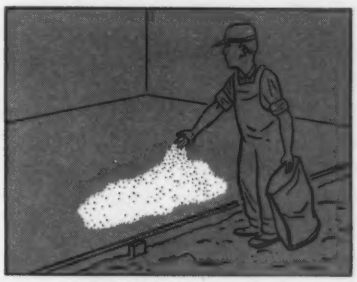


PLASTIC SHRINKAGE CRACKS are often confused with crazing. Condition shown above occurs soon after or during finishing and results from early loss of mix water to dry subgrade, dry aggregates or to the air. They are much deeper and more widely distributed than crazing cracks.

Effect of Slump

The higher the slump, the greater the danger of over-troweling and bringing excessive fines to the surface of the concrete. High-slump concrete is also severely affected by improper curing. In general, it increases the probability of surface problems including crazing.

Dusting on Sand or Cement



The practice of dusting on dry cement to hasten drying and make finishing easier should *not* be followed. This produces a rich cement mortar wearing surface which will craze and very likely scale.

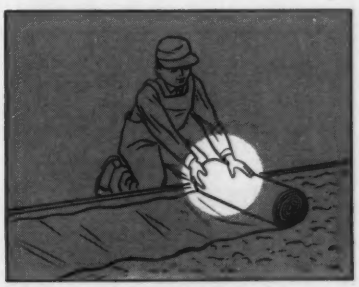
To confirm this, Alpha laboratory technicians made two slabs of the same concrete mix. The first sample was finished according to recommended and accepted practices and produced a smooth, hard, crack-free surface. In the second sample, dry cement was dusted on the surface, and it was not properly cured. This slab was not over-troweled. The results on this sample showed a perfect example of surface crazing.

Inadequate Curing

Inadequate curing causes the surface to dry faster and therefore to shrink faster than the bulk of the concrete. This produces a difference in movement at a time when the concrete wearing surface has attained little strength, resulting in hairline pattern cracks.

Proper Curing Practice

Proper treatment of the concrete after it has been finish troweled is most important in obtaining a smooth, hard, durable wearing surface.



1. Concrete must be kept moist so that cement hardens while continuing to combine chemically with the water.

2. Start curing process after finish troweling as soon as the surface is hard enough to resist damage.

3. Don't allow concrete to air-cure.

More Information

Send for the Alpha Craftsmanship in Concrete Folder #1 which presents much more data on "Steel Trowel Finishing". Reprints of this advertisement are also available on request.

ALPHA

PORTLAND CEMENT COMPANY

Alpha Building, Easton, Pa.

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SIDEWALKS
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The only Stake with a spiral arrangement of nail holes providing 24 prelocated nail entry points insuring a positive nailing position regardless of stake rotation and it drives straight in any ground.

- Set up forming 10 times faster
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EFCO Steel Forms
available with
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Satisfaction is guaranteed when you purchase EFCO Lifetime Steel Forms for your concrete forming needs.

NEW CATALOG

Describes and illustrates EFCO Steel Forms and accessories with examples of many uses. Send coupon for your copy.

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Please send new catalog on EFCO Steel Forms, and address of nearest sales office (there are 29 coast to coast).

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Firm name_____
Address_____
City_____ State_____

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products

For additional information circle matching key number on reader service card on page 136C.

film on prestressing 535

A twenty minute sound-color motion picture illustrating the ease of manufacture and the many in-use advantages of prestressed concrete in the building industry is now available for showings to contractors, architects, engineers, government agencies, and schools. "Building With Prestressed Concrete" shows how the use of prestressed concrete strand increases strength and rigidity and provides adaptability, safety, and improved appearance in concrete. Prestressed concrete is being used increasingly in single and multi-level buildings, bridges, and highway overpasses. Colorado Fuel & Iron Corp., P. O. Box 1920, Denver, Colo.

lightweight concrete 536

The wide use of lightweight aggregate concrete in modern construction is featured in a 20-page bulletin, MBR-P-14. Photographs and job reports present a clear picture of the wide variety of uses for this relatively new and versatile building material. Thirteen construction projects are featured with discussion covering the use of lightweight concrete as a strong, durable structural material for columns, beams and floor slabs, multi-story structures, thin shell concrete and bridge decks. Master Builders Co., Cleveland 3, Ohio.

paving finisher 537

Two separate gas-electric drives power the drive wheels and screeds of a paving finisher. Both machine and screed speed can be adjusted independently for best possible results. Contractors thus get maximum power from each simultaneously —regardless of concrete slump. Smooth power control with infinite speed range virtually eliminates hand finishing even at fast finishing rate. With a float trailer attached the machine becomes a combination finisher-float. Heltzel Steel Form & Iron Company, 1750 Thomas Road, Warren, Ohio.

drill 538

Leaflet E-1155 shows many of the applications to which a lightweight motor drill and breaker is adaptable by contractors, utility companies, mining crews and maintenance departments. Technical features of the 53-pound, gasoline-powered unit are illustrated by a cutaway drawing. Photos show the equipment in use in drilling, breaking, tie tamping, splitting, post-holing, digging, tamping and cutting asphalt. Atlas Copco., 610 Industrial Ave., Paramus, N.J.

tamper 539

A heavy duty power tamper with an 18-inch shoe has been added to this firm's line of tampers. All models are equipped with roller-bearing engines driving massive eccentric loaded rotors. When the eccentric rotor system is operated at recommended speed, the whole machine is picked up, moved forward, and rammed down in short, rapid, continuous cycles. The two 18-inch shoe models can tamp up to 5,400 square feet per hour, while the 36-inch shoe model can tamp 10,800 square feet per hour. Producing more compacting force than a 10-ton roller, they are recommended for use next to foundations and walls, around culverts, piling and piers, in pipeline trenches, and on subbases for road widening jobs. Kelley Machine Division, 285 Chicago St., Buffalo, N. Y.

MAGINNISS UNI-LECTRIC

CONCRETE VIBRATORS

... ideal for smaller concrete jobs!

- universal type motor—plugs into any 110 volt current
- motor-in-head design—cooled by surrounding concrete
- easily handled by one man—no cumbersome flexible shaft and motor
- completely self-contained—can be carried in car trunk or truck tool box
- produces powerful high frequency, low amplitude vibrations for best results—10,000 VPM
- motor is equipped with thermal cut-out.

Model UCV-9

SPECIFICATIONS
MODEL UCV-9

HEAD—2⅜ in. diameter; 14 in. long; weight, 11 lbs.

MOTOR—universal 110 volt ac-dc type; heavy duty brush rigging and commutator; wound armature runs on 2 shielded high speed ball bearings; 10,000 rpm

ECCENTRIC—one-piece alloy steel; designed to match motor characteristics; runs on 2 shielded high speed ball bearings

CABLE—standard 10 ft. operating hose; heavy duty concrete-proof operating switch; 50 ft. rubber-covered 3 conductor cable (3rd wire ground); male 3-prong plug with female connector for attachment to extension cord.

Maginniss Uni-lectric universal concrete vibrators handle medium or high slump concrete effectively. They use on-the-site power (including the dc output of Maginniss Hi-lectric generators, if desired)—are easily carried from job to job. Their cost is low! And, manufactured by the same Maginniss craftsmen who produce heavy duty Hi-lectric vibrators, Uni-lectrics will deliver a maximum amount of dependable service.

Larger contractors will find the Uni-lectric a handy companion for their heavy duty Hi-lectric concrete vibrators—perfect for occasional small pours on bigger jobs.

Ask your Maginniss distributor to show you how the Uni-lectric fits your operation—he'll be glad to demonstrate. *You'll find him listed in the YELLOW PAGES under "Contractors' Equipment"*

MAGINNISS
UNI-LECTRIC
CONCRETE VIBRATORS

MAGINNISS
POWER TOOL COMPANY
For Literature write Dept. CC-50
154 Distl Avenue, Mansfield, Ohio

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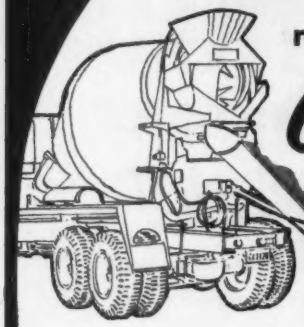
Colored
ready-mixed
Concrete



10 DIFFERENT COLORS

- ECONOMICAL—costs very little extra per square foot . . .
- DURABLE—color all-the-way through the concrete . . .
- PERMANENT—to weather and sunlight . . .

For further information and color card write to

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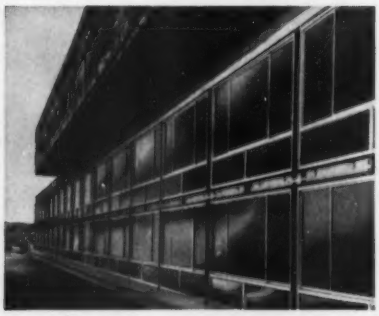
eastern office:
P.O. BOX 292 NIXON, NEW JERSEY

HORNFLEX
Sealant...



for all the wide open beauty of curtain wall design . . .
with none of the weather sealing problems

Hornflex Sealant compresses, stretches and flexes with wall movement—yet keeps a solid weather seal at all temperatures. Bonds lastingly to aluminum, glass, steel, concrete and stone to form a watertight seam that stays put.

Hornflex Sealant also has many uses in swimming pool, highway and bridge construction. Write for 8-page catalog, Dept. CC-144.

A. C. HORN COMPANIES
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Sun Chemical Corporation
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Plants in: ATLANTA • CHICAGO • HOUSTON • DENVER • LOS ANGELES SAN FRANCISCO • PORTLAND, ORE. • NORTH BERGEN, N.J. • TORONTO
Sales offices and warehouses throughout the United States and Canada

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products

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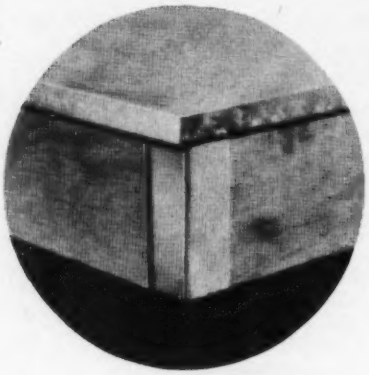
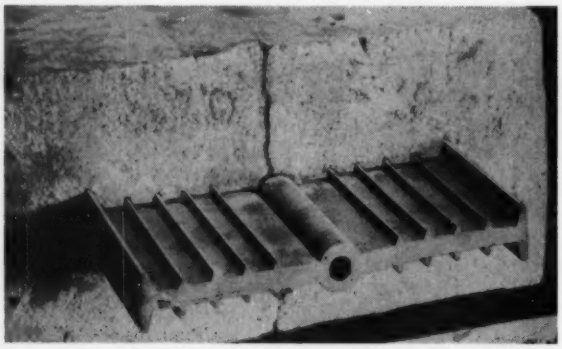


panel forms 540

Galvanized metal edge is said to almost double life of lightweight panel forms, eliminate expensive maintenance and facilitate precision fit. Panels come in modules of 2 by 4, 2 by 6, and 2 by 8 feet, and can be used vertically or horizontally and in combination for any wall height or type. Worn out wooden panels can be easily replaced with new panels as necessary. Forms are claimed to be less expensive than either conventional metal or wood systems and erection and stripping are said to be easy and fast. Engineered Concrete Form Corp., 7626 S. Wentworth Ave., Chicago, Ill.



waterstops 541

Polyvinyl chloride waterstops are available in corrugated lock rib and dumbbell types in a complete range of sizes. These waterstops are claimed by the manufacturer to be superior to metal in providing a compression seal and in permitting expansion and contraction of concrete, which moves waterstops both laterally and in shear. Easy splicing, elimination of the need for special storage facilities and long life are other advantages claimed. Lexsuco, Inc., P. O. Box 326, Solon, Ohio.

products

For additional information circle matching key number on reader service card on page 136C.

salamander 542

Alloyed cast iron elbow, rust-free deep drawn 24-gage hot dipped galvanized bowl, riveted bracket clips, 2-piece stack, and heavier diffusion hood and brackets are features of a salamander which improve operating efficiency and double its life, according to the manufacturer. Positive lock down handles help to prevent accidents. Provides 140,000 Btu's in less than 15 minutes. Nugent Corp., 4400 Superior Ave., Cleveland 3, Ohio.

roof system 543

A lightweight roof system which has been awarded a 2-hour fire rating by Underwriters' Laboratories consists of a 2-inch slab of vermiculite insulating concrete over a vented corrugated steel deck supported on precast concrete joists. The corrugated sheets are welded to steel plates cast into the top chord of the joists. Underside of the deck is fireproofed with ⅞ of an inch of vermiculite acoustical plastic sprayed directly to the steel. The system eliminates a suspended ceiling, reduces wall height, and combines fireproofing and acoustical correction in one material that can be applied quickly. Durability is another advantage, since the insulating concrete does not deteriorate from moisture. Vermiculite Institute, 208 S. LaSalle St., Chicago, Ill.

bonding agent 544

Six-page catalogue describes a liquid resinous emulsion bonding agent for concrete, plaster, stucco, gypsum, cinder block, and tile, with a complete description of the product, its color, properties, function, method of application, coverage, and tests for vibration, acidity and toxicity together with packaging information and architect's specifications. A. C. Horn Companies, 2133 - 85th St., North Bergen, N. J.

curing compound 545

A clear, ready-to-use, liquid solution that is easily applied to fresh concrete using spray, roller or brush is said to dry quickly and to retain over 95 percent moisture, thus permitting complete hydration and maximum strength. Also seals the pores of concrete floors against most acids, oils, greases and other foreign materials, permitting completion of heating, wiring and plastering work without causing expensive clean-up of new concrete. Deterioration and dusting common in untreated concrete floors is also prevented according to the manufacturer. After curing paints, tile or linoleum can be applied directly to surface without removal of the curing membrane. Tretol, Inc., 7252 W. 66th St., Chicago, Ill.

prestressed concrete 546

Two long-span prestressed concrete folded plate projects are described in a catalogue. The projects employ post-tensioning to resist longitudinal beam action, and to join together the folded plates which were cast in sections for ease of transportation. Construction and erection photographs are shown. Freyssinet Company, 62 William St., New York, N. Y.

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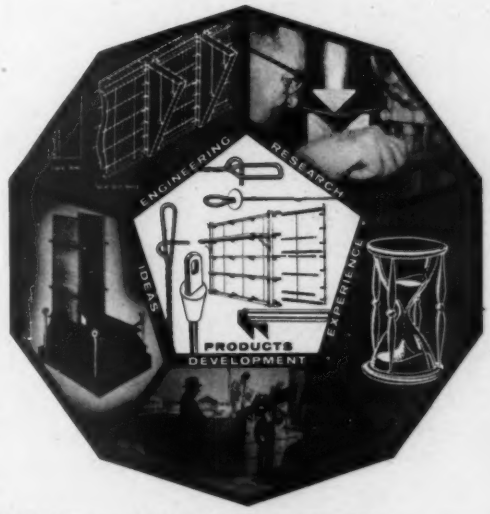

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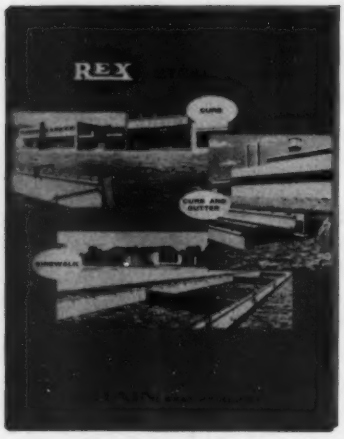

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news

Concrete Contractors Association of Ohio

At the March meeting of the Concrete Contractors Association of Ohio the following officers were elected to serve for the coming year: Fred A. Finomore, Cleveland, president; Arthur Fabbro, Akron, first vice president; William Lantz, Youngstown, second vice president; and Ron Mossing, Toledo, treasurer. Reappointed as legal counsel was Rocco J. Russo, attorney, Cleveland. George Martter, Executive Manager of the Akron Builders Exchange, Akron, was appointed as executive secretary, replacing Clarence C. Hanna, who has resigned.

Concrete Joint Institute

Concrete Joint Institute is the name of the association of premolded joint manufacturers formerly known as Expansion Joint Institute. Their new office is at 360 North Michigan Avenue, Chicago.

At the recent meeting of the Institute's board of directors Harry G. Meadows of W. R. Meadows, Elgin, Illinois, was elected president, James C. Whitney of Celotex Corporation, Chicago, vice president, and Wallace C. Fischer of Servicised Products Corporation, Chicago, treasurer.

The Institute was organized in 1955 and is dedicated to the improvement of the science of road building through research in the manufacture and the application of premolded control joint materials, and through collecting and disseminating data and other pertinent information on highway design and performance.